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OF THE

TORREY BOTANICAL CLUB

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Some Generic Segregations

BY P. A. RYDBERG

(WITH PLATES 13 AND 14)

The concept of a genus may vary among botanists as well as among zoölogists. To some a genus is an aggregate of all forms of organisms which can be included within a certain artificial description or diagnosis; to others it is a natural group of closely related species or forms and may be modified, extended or limited as soon as these forms become better known. It is unnecessary to state that the former view nowadays has very few advocates, for nature was never made to follow the narrow concepts of man. A systematist who holds the second view, tries first to find what species are closely related, and when these are brought together, he tries to draw a diagnosis of the genus. The limitation of a genus depends naturally upon the personal views of the taxonomist. What is a single genus to one botanist may to another constitute half a dozen or more good genera, *i. e.*, groups of related species. It matters little how broad or narrow concepts we have of a genus, if only we are consistent and in the same family or tribe designate as genera equivalent natural groups of related species; *i. e.*, not making in one case the limits of a genus too large and in another too narrow.

I. An inconsistency of this kind exists, I think, in the usual treatments of the family Melanthaceae. *Chrosperma* and *Stenanthium*, *Melanthium* and *Veratrum*, are separated by rather trifling characters, while in *Zygadenus* are included species of no closer relationship. If we keep as distinct all of the first four genera,

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we must, if consistent, divide *Zygadenus* into at least three genera. Briefly these may be distinguished as follows:

Plant with a rootstock; each petal and sepal with two glands.	*Zygadenus.*
Plant with a bulb; each petal and sepal with a single gland.	
Ovary wholly superior; gland obovate or semi-orbicular.	*Toxicoscordion.*
Ovary partly inferior; gland obcordate.	*Anticlea.*

ZYGADENUS Michx. Fl. Bor. Am. **1**: 213. 1803

This genus was established on a single species *Z. glaberrimus* and the generic name will go with it. This species differs from all that later have been included in the genus, in having a thick elongated rootstock instead of a bulb and two distinct round glands on each of the petals and sepals. As far as I know the genus consists of only one species.

Toxicoscordion gen. nov.

Glabrous, more or less poisonous perennials with narrow linear conduplicate leaves, yellowish racemose or paniculate flowers and membrane-coated bulbs. Flowers perfect (in one species described as polygamous, but as far as I know erroneously so). Petals and sepals bearing a single obovate or semiorbicular gland at or above the base of the blade, in most species more or less clawed. Ovary wholly superior. Stamens (except in one species) more or less adnate to the base of the petals and sepals; anthers subreniform, confluently one-celled. Capsule 3-celled, 3-beaked, septicidal. Seeds numerous.

The first species known belonging to this group was published under the name *Amianthium Nuttallii* A. Gray; but as this is somewhat aberrant from the general type of the genus, I have selected one of the most common species, *Zygadenus intermedius*, as the type. The following species belong here:

1. **T. intermedium**; *Z. intermedius* Rydb.*
2. **T. venenosum** (S. Wats.); *Z. venenosus* S. Wats.
3. **T. gramineum**; *Z. gramineus* Rydb.
4. **T. acutum**; *Z. acutus* Rydb.
5. **T. falcatum**; *Z. falcatus* Rydb.
6. **T. paniculatum** (Nutt.); *Helonias paniculata* Nutt.
7. **T. Nuttallii** (A. Gray); *Amianthium Nuttallii* A. Gray.

* For citations and synonyms, see Bull. Torrey Club, **27**: 534–538. 1900.

8. **T. Fremontii** (Torr.); *Anticlea Fremontii* Torr. Pac. R. R. Rep. **4**: 144. 1856; *Zygadenus Fremontii* Torr.; S. Wats. King's Exped. **5**: 343. 1871.

ANTICLEA Kunth.

This genus was established on *A. Sibirica* and *A. glauca* with *A. Mexicana* added as a doubtful species. *A. Sibirica*, the first one mentioned, must be regarded as the type. It differs somewhat from our American species, especially in the narrow somewhat recurved petals and sepals and the narrow glands, but these differences are rather unimportant and do not warrant any generic separation. The genus is characterized by a membranous coated bulb, linear glabrous leaves, greenish or yellowish-white flowers, withering persistent petals and sepals, which are adnate to the base of the ovary and bear a single obcordate gland; free stamens and a partly inferior ovary. The species are:

1. A. SIBIRICA (L.) Kunth, Enum. **4**: 191. 1843; *Melanthium Sibiricum* L. Sp. Pl. 339. 1753; *Zygadenus Sibiricus* Kunth, Enum. **4**: 192, as synonym.
2. **A. chlorantha** (Richards.); *Z. chloranthus* Richardson, Frankl. Journ. 736. 1821; *Z. commutatus* Schultes, Syst. **7**: 1560. 1830; *Z. glaucus* Nutt. Jour. Acad. Phila. II. **7**: 56. 1834; *Anticlea glauca* Kunth, Enum. **4**: 192. 1843.
3. **A. virescens** (H.B.K.); *Helonias virescens* H.B.K. Nov. Gen. & Sp. **1**: 267. 1816; *A. Mexicana* Kunth, Enum. **4**: 193. 1843; *Z. Mexicanus* Hemsl. Biol. Cent. Am. **3**: 382. 1885.
4. **A. elegans** (Pursh); *Z. elegans* Pursh, Fl. Am. Sept. 241. 1814.
5. **A. Coloradensis**; *Z. Coloradensis* Rydb. Bull. Torrey Club, **27**: 534. 1900.
6. **A. porrifolia** (Greene); *Z. porrifolius* Greene, Bull. Torrey Club, **8**: 123. 1881.

II. Another segregation needed, I have found in the genus *Rubus*. If *Dalibarda* is to be held distinct from that genus and *Duchesnea* from *Fragaria*, etc., certain species have to be removed from *Rubus* as now understood, as both in general habit and the

structure of the fruit they are so unlike the rest of the species. The segregated genera would be distinguished as follows:

Styles club-shaped; stigmas slightly 2-lobed; receptacle flat; shrubs, unarmed, with shreddy bark and digitately ribbed maple-like leaves.
Drupelets capped by hard hairy cushions; styles glabrous; erect shrubs. *Rubacer.*
Drupelets without cushions; styles hairy; prostrate or reclining vines. *Oreobatus.*
Styles filiform, glabrous; stigmas usually capitate; receptacle hemispherical, conical or nipple-shaped; drupelets without cushions; leaves in most species pinnate and stem in most prickly. *Rubus.*

Rubacer gen. nov.

Unarmed shrubs with more or less shreddy bark, more or less glandular above. Leaves petioled, simple, digitately ribbed and lobed, with acute or acuminate lobes and cordate bases, resembling the leaves of certain maples. Flowers showy, in small panicles: sepals ovate with long slender acuminations: petals pink or white, oval or rounded: pistils numerous: receptacle flat or nearly so: drupelets numerous, capped with a dry, rather hard, finely and densely pubescent cushion with the club-shaped style attached under the margin.

The type is the first species cited below.

1. **Rubacer odoratum** (L.); *Rubus odoratus* L. Sp. Pl. 494. 1753.
2. **Rubacer parviflorum** (Nutt.); *Rubus parviflorus* Nutt. Genera **1**: 308. 1818; *Rubus Nutkanus* Moc.; Seringe, DC. Prodr. **2**: 566. 1825.
3. **Rubacer tomentosum**; *Rubus velutinus* Hook. & Arn. Bot. Beechey Voy. 140. 1841; Not Vest. 1823.
4. **Rubacer Columbianum** (Millsp.); *Rubus odoratus* var. *Columbianus* Millsp. Bull. W. Va. Agr. Exp. Sta. **2**: 355. 1892.

Oreobatus gen. nov.

Prostrate or reclining shrubby vines with light colored, shreddy bark. Leaves petioled, simple, maple- or gooseberry-like, digitately ribbed and lobed with rounded serrate lobes. Flowers showy, usually solitary: sepals ovate or ovate-lanceolate, acuminate or the tips foliaceous, in fruit erect: petals white, 1.5–3 cm. long, broadly obovate: stamens very numerous, hiding the fewer pistils: receptacle flat or nearly so: styles club-shaped, curved; stigma somewhat 2-lobed; young fruit apparently very pubescent, owing to the hairy styles: drupelets not very fleshy, without hairy cushions.

The first of the following two species is regarded as the type:

1. **O. deliciosus** (James); *Rubus deliciosus* James; Torr. Ann. Lyc. N. Y. **2**: 196. 1828.

2. **O. Neo-Mexicanus** (A. Gray); *Rubus Neo-Mexicanus* A. Gray, Pl. Wright. **2**: 55. 1853.

III. A similar inconsistency we find in the Loasaceae, where the genus *Mentzelia* as it is represented in United States is composed of at least four distinct groups deserving generic rank * with just as good right as several other recognized genera in the family.

The principal distinguishing characters are:

Placentae with horizontal lamellae between the seeds; these in 2 rows.
Filaments 3-cleft at the apex, the middle tooth bearing the anthers, the lateral teeth cuspidate; seeds angled or with folds, not winged; annuals. *Bicuspidaria.*
Filaments not cleft; seeds very flat, more or less winged; perennials. *Touterea.*
Placentae without lamellae; seeds usually prismatic.
Placentae slender, filiform; ovules in one row, 10–40; seeds minutely muricate, not striate; filaments free or nearly so. *Acrolasia.*
Placentae broad, band-like; ovules in 1–2 rows, few; seeds distinctly striate, often rugose; filaments at the base united with the petals into a ring. *Mentzelia.*

Bicuspidaria (S. Wats.) gen. nov.

Mentzelia § *Bicuspidaria* S. Wats. Proc. Am. Acad. **20**: 367. 1885.

Annuals with rather large flowers. Petals 5, free; stamens 80–130, dilated, 3-cleft at the apex, the middle tooth bearing the anthers; placentae with a vertical wing and horizontal lamellae between the ovules and seeds; these 15–40 in 2 rows on each placenta; capsule cylindric, inflated, sessile, thin-walled; seeds irregular, angled or with folds, not winged.

The first of the following species is taken as the type.

1. **B. tricuspis** (A. Gray); *Mentzelia tricuspis* A. Gray, Am. Nat. **9**: 271. 1875.

2. **B. involucrata** (S. Wats.); *Mentzelia involucrata* S. Wats. Proc. Am. Acad. **20**: 367. 1885.

3. **B. hirsutissima** (S. Wats.); *Mentzelia hirsutissima* S. Wats. Proc. Am. Acad. **12**: 252. 1877.

* It may be that the other three sections of Urban and Gilg, viz., *Micromentzelia*, *Octopetaleia* and *Dendromentzelia* should also be treated as genera; but better knowledge is needed.

TOUTEREA Eaton & Wright, N. Am. Bot. 454. 1840

Bartonia Sims, Bot. Mag. *pl. 1487*. 1804. Not Muhl. 1801.

Torreya Eat. Man. Ed. 7. 560. 1836. Not Raf. 1818.

Hesperaster Cockerell, Torreya, **1**: 142. 1901.

This genus contains nearly all the large-flowered species included in *Mentzelia*. The outer filaments are more or less dilated; in most they are without anthers and in some as large as and resembling the petals. These species are often described as having ten petals. The genus *Touterea* was based on the first two species mentioned below; *Bartonia* Sims on *Bartonia decapetala* and the type of *Hesperaster* is the same. As far as I know, the following species belong here:

1. **T. decapetala** (Pursh); *Bartonia decapetala* Pursh, Bot. Mag. *pl. 1487*. 1812; *B. ornata* Pursh, Fl. Am. Sept. 327. 1814; *Touterea ornata* Eat. & Wright, N. Am. Bot. 454. 1840; *M. ornata* Torr. & Gray, Fl. N. Am. **1**: 534. 1840.
2. **T.** NUDA (Pursh) Eat. & Wright, N. Am. Bot. 454. 1840; *Bartonia nuda* Pursh, Fl. Am. Sept. 328. 1814; *M. nuda* Torr. & Gray, l. c.
3. **T. laevicaulis** (Dougl.); *Bartonia laevicaulis* Dougl.; Hook. Fl. Bor. Am. **1**: 221. 1833; *M. laevicaulis* Torr. & Gray, Fl. N. Am. **1**: 535. 1840.
4. **T. Brandegei** (S. Wats.); *M. Brandegei* S. Wats. Proc. Am. Acad. **20**: 367. 1885.
5. **T. parviflora** (Dougl.); *B. parviflora* Dougl.; Hook. Fl. Bor. Am. **1**: 221. 1833.
6. **T. pterosperma** (Eastw.); *M. pterosperma* Eastw. Proc. Cal. Acad. II. **6**: 290. 1896.
7. **T. stricta** Osterhout Mss.; *Hesperaster strictus* Osterhout, Bull. Torrey Club, **29**: 174. 1902.
8. **T. Rusbyi** (Wooton); *Mentzelia Rusbyi* Wooton, Bull. Torrey Club, **25**: 261. 1898.
9. **T. Wrightii** (A. Gray); *M. Wrightii* A. Gray, Pl. Fendl. 48. 1848.
10. **T. speciosa** Osterhout Mss.; *M. speciosa* Osterh. Bull. Torrey Club, **28**: 689. 1901; *M. aurea* Osterh. Bull. Torrey Club, **28**: 644. 1901. Not Nutt. 1818.

11. **T. densa** (Greene); *M. densa* Greene, Pittonia, **3**: 99. 1896.
12. **T. pumila** (Nutt.); *M. pumila* Nutt.; Torr. & Gray, Fl. N. Am. **1**: 535. 1840.
13. **T. chrysantha** (Engelm.); *M. chrysantha* Engelm.; Brand. Bull. U. S. Geol. Surv. Terr. **2**: 237. 1876; *M. lutea* Greene, Pittonia, **3**: 99. 1896.
14. **T. humilis** (A. Gray); *M. multiflora* var. *humilis* A. Gray, Pl. Wright. **1**: 74. 1852.
15. **T. multiflora** (Nutt.); *Bartonia multiflora* Nutt. Jour. Acad. Phila. II. **1**: 180. 1847.
16. **T. perennis** (Wooton); *M. perennis* Wooton, Bull. Torrey Club, **25**: 260. 1898.
17. T. MULTICAULIS Osterhout, Bull. Torrey Club, **30**: 236. 1903.

ACROLASIA Presl. Rel. Haenk. **2**: 39. 1831

Trachyphytum Nutt.; Torr. & Gray, Fl. N. Am. **1**: 533. 1840.

This genus was established on a Chilian species, *A. bartonioides* Presl, which has fewer ovules (12) and fewer stamens than its North American allies, but the structure of the ovary and seeds is the same. All the species are annuals and characterized by the long cylindric capsules, the filiform placentae and the muricate more or less prismatic seeds. Most of the species are small-flowered, with linear, lanceolate or ovate-oblong, laciniate, dentate or more rarely entire sessile leaves. The following North American species belong here:

1. **A. congesta** (Nutt.); *M. congesta* Nutt.; Torr. & Gray, Fl. N. Am. **1**: 534. 1840; *Trachyphytum congestum* Nutt.; Torr. & Gray, l. c.
2. **A. ctenophora**; *M. ctenophora* Rydb. Bull. Torrey Club, **28**: 33. 1901.
3. **A. Tweedyi**; *M. Tweedyi* Rydb. Mem. N. Y. Bot. Gard. **1**: 271. 1900.
4. **A. albicaulis** (Dougl.); *M. albicaulis* Dougl.; Hook. Fl. Bor. Am. **1**: 222. 1833; *Bartonia albicaulis* Hook. l. c.
5. **A. tenerrima**; *M. tenerrima* Rydb. Mem. N. Y. Bot. Gard. **1**: 271. 1900.

6. **A. integrifolia** (Wats.); *M. albicaulis* var. *integrifolia* S. Wats. King's Exp. **5**: 114. 1871; *M. dispersa* S. Wats. Proc. Am. Acad. **11**: 115. 1876.
7. **A. compacta** (A. Nelson); *M. compacta* A. Nels. Bull. Torrey Club, **25**: 275. 1898.
8. **A. gracilenta** (Torr. & Gray); *M. gracilenta* Torr. & Gray, Fl. N. Am. **1**: 534. 1840.
9. **A. affinis** (Greene); *M. affinis* Greene, Pittonia, **2**: 103. 1890.
10. **A. aurea** (Lindl.); *Bartonia aurea* Lindl. Bot. Reg. **22**: *pl. 1831*. 1836. Not *Mentzelia aurea* Nutt. 1818; *M. Lindleyi* Torr. & Gray, Fl. N. Am. **1**: 533. 1840.
11. **A. nitens** (Greene); *M. nitens* Greene, Fl. Francisc. 234. 1891.
12. **A. Veatchiana** (Kellogg); *M. Veatchiana* Kellogg, Proc. Cal. Acad. **2**: 99. 1863.
13. **A. pectinata** (Kellogg); *M. pectinata* Kellogg, Proc. Cal. Acad. **3**: 40. 1868.
14. **A. micrantha** (Torr. & Gray); *M. micrantha* Torr. & Gray, Fl. N. Am. **1**: 535. 1840.

IV. A fourth segregation is proposed in *Synthyris*. Professor Greene has included this genus in *Wulfenia* and he has been followed by many American botanists. *Wulfenia*, represented by European and Asiatic plants, has a 4-valved capsule, which is neither flattened nor emarginate at the apex, and a corolla with a long tube. All the American species have flattened capsules, which are 2-valved and obcordate at the apex. In this respect they agree perfectly with *Veronica*. The original *Synthyris* (*S. reniformis*) and a few related species have a corolla that is built exactly on the same plan as that of *Veronica*, and it is only the general habit that keeps them out of that genus. *S. alpina* and its relatives, on the contrary, have an altogether different corolla, cleft to near the base into two distinct lips. *S. rubra* and its allies have no corollas but agree otherwise both in general appearance and structure of the flower and fruit with *S. alpina*. It would however hardly be advisable to place them in different genera merely on account of the presence or absence of the corolla. The related genera are distinguished as follows:

Corolla scarcely 2-lipped; almost equally deeply 4-lobed.
Corolla tubular-funnelform; capsule neither flattened nor obcordate at the apex, 4-valved.
Leaves alternate but mostly basal. *Wulfenia.*
Leaves opposite; stem leafy. *Leptandra.*
Corolla rotate or short-campanulate; capsule flattened, obcordate, 2-valved.
Leaves opposite or whorled; stem leafy. *Veronica.*
Leaves alternate, but mostly basal; plant with a mostly naked scape. *Synthyris.*
Corolla, if present, deeply 2-lipped; upper lip entire, broad, arcuate; lower lip straight and deeply laciniate; leaves alternate but mostly basal; scape bracted. *Besseya.*

SYNTHYRIS Benth.; DC. Prodr. **10**: 454. 1846

This genus was based on *S. reniformis*. *S. rubra* was also included in the genus by the author, but he admits that it is a rather anomalous member, lacking the corolla. It is, however, more nearly related to *S. alpina*, which has a corolla of a different structure. The species belonging here are the following: *S. reniformis* (Dougl.) Benth., *S. major* (Hook.) Heller, *S. pinnatifida* S. Wats. and *S. laciniata* (Gray) Rydb. Whether *S. rotundifolia* A. Gray should also be included or should be made the type of a separate genus is a little doubtful. At present I am inclined to regard it as a *Synthyris*. So also *S. schizantha* Piper, with lacerate corolla-lobes, which species is still more aberrant.

Besseya gen. nov.

Low perennials with a thick rootstock. Basal leaves petioled; blades ovate or oblong, crenate; stem-leaves bract-like, alternate: inflorescence a bracted spike: calyx almost regularly 4-cleft to near the base or cleft to the base on the upper side and then 2–3-lobed: corolla 2-lipped, cleft to near the base, or lacking; upper lip, if present, entire, obovate or cuneate-obovate, concave; lower lip much shorter, often irregularly 2–3-cleft or laciniate: stamens 2, attached at the base of the corolla, or if this is absent on a small disk: capsule flattened, obcordate, 2-valved.

It is with pleasure that I dedicate this genus of western mountain plants to Professor Charles E. Bessey, of the University of Nebraska, my former teacher and the most prominent botanist of the region where these small plants grow.

The first species cited below is regarded as the type.

a. With corolla:

1. **B. alpina** (A. Gray); *Synthyris alpina* A. Gray, Am. Jour. Sci. II. **34**: 251. 1862.
2. **B. Bullii** (Eaton); *Gymnandra Bullii* Eat.; Eat. & Wr. N. Am. Bot. 259. 1840; *Synthyris Houghtoniana* Benth.; DC. Prodr. **10**: 454. 1846.
3. **B. plantaginea** (Benth.); *S. plantaginea* Benth.; DC. Prodr. **10**: 455. 1846.
4. **B. reflexa** (Eastw.); *S. reflexa* Eastw. Proc. Cal. Acad. III. 1: 124. 1898.
5. **B. Ritteriana** (Eastw.); *S. Ritteriana* Eastw. l. c. 123.

b. Without corolla:

6. **B. rubra** (Dougl.); *Gymnandra rubra* Dougl.; Hook. Fl. Bor. Am. **2**: 103. 1838; *Synthyris rubra* Benth.; DC. Prodr. **10**: 455. 1846.
7. **B. gymnocarpa** (A. Nels.); *Wulfenia gymnocarpa* A. Nelson, Bull. Torrey Club, **25**: 282. 1898.
8. **B. Wyomingensis** (A. Nels.); *W. Wyomingensis* A. Nelson, l. c. 281.

NEW YORK BOTANICAL GARDEN.

Explanation of Plates

PLATE 13

FIG. 1. *Zygadenus glaberrimus* Michx. **a**, section of flower; **b**, sepal; **c**, petal; **d**, stamens; **e**, pistils.

FIG. 2. *Toxicoscordion intermedium* Rydb. **a**, **b**, etc., as above.

FIG. 3. *Anticlea elegans* (Pursh) Rydb. **a**, **b**, etc., as above.

FIG. 4. *Anticlea Sibirica* (L.) Kunth. **a**, **b**, etc., as above.

FIG. 5. *Rubus nigrobaccus* Bailey. **a**, section of receptacle; **b**, a young drupelet; **c**, stone.

FIG. 6. *Rubacer odoratum* (L.) Rydb. **a**, **b**, **c**, as in the preceding.

FIG. 7. *Oreobatus deliciosus* (James) Rydb. **a**, **b**, **c**, as in the preceding.

PLATE 14

FIG. 1. *Touterea decapetala* (Pursh) Rydb. **a**, section of the flower showing two of the petals and two of the similar staminodia; **b**, one of the petals; **c**, stamens; **d**, style; **e**, partial section of the capsule showing one placenta in front view and half of another in lateral view; **f**, winged seed.

FIG. 2. *Bicuspidaria tricuspis* (A. Gray) Rydb. **a**, section of flower; **b**, fruit; **c**, pistil; **d**, stamen with the two cusps; **e**, section of a part of the capsule, showing in

lateral view one half of two placentae with seeds, between them the horizontal lamellae and behind the vertical wings; between the latter are seen seeds on the third placenta; **f**, a seed.

FIG. 3. *Acrolasia albicaulis* (Dougl.) Rydb. **a**, section of flower; **b**, petal; **c**, stamens; **d**, pistil; **e**, capsule; **f**, longitudinal section of the same showing the narrow filiform placenta with seeds removed; **g**, a muricate prismatic seed.

FIG. 4. *Mentzelia oligosperma* Nutt. **a**, section of flower; **b**, stamen; **c**, pistil; **d**, section of a part of the capsule, showing the broad placenta with the seeds removed, except one; **e**, a striate seed.

FIG. 5. *Synthyris reniformis* (Dougl.) Benth. **a**, a flower; **b**, sepal; **c**, corolla laid open; **u**, upper lip; **l**, lower lip; **d**, pistil.

FIG. 6. *Besseya alpina* (A. Gray) Rydb. **a**, **b**, etc., as in the preceding.

Botanical Explorations in Georgia during the Summer of 1901.—I. Itinerary

By Roland M. Harper

My work on the flora of Georgia in 1901 was chiefly confined to the coastal plain, where more interesting botanical problems seem to be encountered than in any other part of the state. I entered the state at Savannah on the 4th of June, and on the morning of the same day went up to Millen, 78 miles northwest of Savannah, on the line between Burke and Screven counties, and about a mile east of the Ogeechee River, which here forms the northern boundary of Emanuel County. On the 5th I made two trips to the river (nos. 756–801),* exploring the swamps on both sides of it.

On the following day I went to the northern part of Bulloch County for a few weeks' stay at the home of a friend. Soon after crossing the Ogeechee River the pine-barrens (which are almost wanting in the vicinity of Millen), with their characteristic flora, made their appearance. At Graymont, in Emanuel County, where I left the railroad, I stopped to do a little collecting (nos. 803–820) before proceeding to my destination.

From the 7th to the 18th I was occupied in making the acquaintance of the plants of Bulloch County, collecting during this time several species of more than ordinary interest (nos. 821–916). The flora (making allowance for the difference in season) and the topography of northern Bulloch County were found quite similar to those of that part of Coffee County visited in September, 1900.

The floral areas of northern Bulloch County fall quite readily into the following five principal classes: sand-hills, dry, rather dry, and wet pine-barrens, and swamps (the last being perhaps capable of some subdivision). Each intergrades more or less with those next to it, but it is rare for any one species to be found in more than two of them. Some genera, however, have representatives in all. This is notably the case with *Rhynchospora*, which seems

* These numbers refer to the plants collected.

to be one of the largest genera of spermatophytes in this part of the state. The pine-barren ponds which are so characteristic of some parts of southwest Georgia are rare or wanting here.

Bulloch County is of interest historically as having been in all probability at one time the home of Mr. John Abbot, who has so skilfully portrayed a number of the interesting plants of Georgia in his "Natural History of the rarer Lepidopterous Insects of Georgia," published in 1797. Having examined this work a few weeks previously, I noticed on coming to Bulloch County the large number of plants growing in the vicinity which had been

FIG. 1. Scene on the dunes of Tybee Island, showing *Sabal Palmetto*. June 21.

figured by Mr. Abbot, a larger proportion than I had ever seen elsewhere; and I collected several of them in order to throw more light on those which had never been definitely identified.

On June 19 I went down to Savannah to spend a few days in that vicinity. On the 20th I collected (nos. 917–922) near Guyton, in Effingham County, thirty miles from Savannah, and on the 21st (nos. 923–933) on Tybee Island, at the mouth of the Savannah River. In Savannah I was joined by my brother, Otto T. Harper, who accompanied me most of the time during the rest of the summer, and assisted me with some of the work.

On the 22d I was back in Effingham County, and in the afternoon walked from Guyton to Springfield, the county seat, about six miles back from the railroad (nos. 934–938). The pine-barrens around Guyton differ from those farther inland in being more level and full of shrubs, mostly *Ilex glabra*, with some *Xolisma ferruginea* and two or three small species of *Quercus*. In the vicinity of Springfield, however, a marked difference is to be noted. About half way from Guyton to Springfield the country becomes rather hilly, and the pine-barrens disappear, giving way to shady deciduous woods sheltering many species of more northern distribution. This feature continues the rest of the way to Springfield

FIG. 2. Rosemary sand-hills, Emanuel County, Georgia. "Rosemary" (*Ceratiola ericoides*) in the foreground. June 28.

and probably some distance beyond. Springfield is on the divide between the Ogeechee and Savannah rivers, and must be considerably higher than Guyton, which is near the Ogeechee and only about seventy-five feet above sea-level.

On June 24 I returned to Bulloch County, by way of Dover, Statesboro and Pulaski, collecting a few plants (nos. 939–943) at the latter place before starting across the country to my destination. For the next ten days I continued my studies of the flora of

Bulloch County, with most interesting results. During the first few days of my stay there I had heard some mention of a "Rosemary Church," several miles away, and on asking my friends if it did not derive its name from some plant, I was answered in the affirmative, and was given an interesting description of the place, but it was not until June 28 that I had an opportunity to visit it. Rosemary Church is situated on the left bank of Fifteen Mile Creek, in Emanuel County, among sand-hills of quite a different type from those seen elsewhere. The sand here is whiter than that of the ordinary sand-hills, and is said to be deeper, but as far as we know at present it is of the same Columbia formation. *Ceratiola ericoides*, the "rosemary," from which the place takes its name, is the most characteristic plant. The flora is not so rich as that of the ordinary sand-hills, but is composed mostly of different species, some of which will be mentioned in the latter part of this paper. The absence of grasses is a noteworthy feature. These rosemary sand-hills doubtless represent the extreme of xerophytic conditions in this region. My numbers 975–984 were secured on this trip to this rosemary sand-hills in Emanuel County, and numbers 944–974 and 985–988 were collected in Bulloch during the remainder of my stay there.

This eastern portion of the coastal plain of Georgia was quite familiar ground to Bartram, Michaux, Elliott, Baldwin, Beyrich and other early botanists, but has been considerably neglected since their time. After seeing many of the species of these authors in their type regions I found that I was able to understand them much better than before. This kind of study is much more satisfactory in many cases than any amount of examination of type specimens, too many of which are poorly preserved or accompanied by insufficient data.

On the morning of July 3 I left Bulloch County and drove over to Graymont on my way to the southwestern part of the state, stopping there again to collect a few plants (nos. 989–993). At Stillmore I also had a few hours to wait, and collected there numbers 994–996. During the afternoon I proceeded to Collins, in Tattnall County, where I remained until the next morning (nos. 997–1002). Collins seems to be in the same belt of flat country as Waycross, though it is considerably higher (235 feet above sea

level). The rolling country appears again immediately west of Collins, however.

On the 4th I resumed my journey, and after traveling almost due west for 126 miles, mostly through rolling pine-barrens, stopped at Leslie, in Sumter County, where I had spent some time the previous year, though later in the season. My brother had preceded me there by several days. We made Leslie our headquarters until the latter part of August, in the meanwhile making several trips of greater or less extent to various places south and west of there. Within easy walking distance of Leslie, in the counties of Sumter, Lee and Dooly, I collected numbers 1003–1017, 1025–1082 and 1102–1126 in July and 1241–1247 in August. Numbers 1018–1024 and 1127–1146 were collected in and near Americus in July.

On July 17 we started on a journey to the Chattahoochee River, about seventy miles west, passing through the counties of Webster and Stewart, and into the terrane of the Cretaceous formations, corresponding to the "Central Prairie Region" of Alabama. The prairie feature seems to be lacking in Georgia, however, this region being more hilly than any other portion of the coastal plain of the state, some of the hills rising to a height of about 700 feet above sea-level. As far as I am aware, nothing has ever been published on the flora of this Cretaceous region of Georgia, beyond a few references by Bartram, who passed through the upper part of it in the summer of 1776, and described the natural features of the country in his "Travels," published several years later. Unfortunately a large proportion of this region is now under cultivation or has been otherwise tampered with, making the study of its natural floral conditions rather difficult, and in our short stay I did not have time to wander far from the highways of travel in order to study the more primitive conditions.

On the morning of the 18th I collected numbers 1083–1087 at Lumpkin and Union in Stewart County during the stops of our train. That afternoon we stopped at Omaha, the last station on the Georgia side of the river, and walked down the river a few miles (nos. 1088–1094). The most interesting plants were found immediately on the banks of the river, which are here about sixty feet high and very steep, and are covered with a dense growth of

trees, of great variety and often of magnificent proportions, interspersed with cane-brakes of *Arundinaria gigantea* twenty or twenty-five feet tall. *Taxodium distichum* is here conspicuous by its absence, whether because of the steepness of the banks, or for some other reason, I do not know. These banks are so high that they are never overflowed, consequently there are no "bottom lands" along the river here.

At the time and place of our visit to the Chattahoochee River about ten feet of Cretaceous rocks were exposed at the base of the bank, rising perpendicularly from the water's edge, the rest of the bank being composed of the Columbia sands. Very few flowering plants grow on these rocks, which are difficult of access on account of their perpendicularity, but numerous springs issuing from the bank along the line of contact of the two formations supply moisture for many mosses and liverworts.

Early the next morning we visited an interesting pond (the only one seen in the Cretaceous region) in the woods south of Omaha (nos. 1095–1099). Later in the day we went up the left bank of the river a few miles (nos. 1100, 1101), then turned away from the river and walked east as far as Louvale. On the morning of the 20th we walked to Lumpkin, and from there took the next train back to Leslie. Between the river and Louvale I did not stop to do any collecting, but made many notes on the flora of the Cretaceous uplands. The flora of this region, at least in Stewart County, seems to be mostly a mixture of that of the Tertiary region nearer the coast and the metamorphic region on the north, with few if any endemic species. The abundance of *Arundinaria* is one peculiar feature, however, as in the corresponding portion of Alabama. The Cretaceous region of Georgia is doubtless analogous to the "tension zone" of New Jersey (described by Dr. Hollick*), which is also Cretaceous.

Our next trip outside of Sumter County was on the first three days of August, to Adams, in Lee County, midway between Americus and Albany. While traveling southward from Americus I was interested to see the same succession of topographic and floral zones that I was already familiar with between Americus and the Flint River to the eastward. These zones, which seem

* Am. Nat. 33: 1–14, 109–116. 1899.

to correspond with certain geological formations, here run in a general northeasterly and southwesterly direction.

On the train I met a former acquaintance, whose home was in Baker County, and after I had explained to him the object of my travels he mentioned that the cane (doubtless *Arundinaria gigantea*) had flowered in the vicinity of his home that spring, an occurrence which had never before been known to the oldest inhabitants. This corresponds with the observations of Dr. Mohr in Alabama, published on the preceding day.*

Adams is evidently in the same pine-barren zone as Leslie, but around Adams the Lafayette formation is mostly overlaid by the Columbia, which makes some difference in the flora. We remained in the vicinity until the 3d, during that time crossing Kinchafoonee Creek on the west and Muckalee on the east (nos. 1147–1162). On the east side of Muckalee Creek, some eight or ten miles southeast of Adams, are some interesting limesinks, a few of which were visited on the afternoon of the 2d. On the return trip to Leslie the next day, which was made partly on foot, I collected *Plantago sparsiflora* (no. 1163) near Smithville in Lee County and an apparently undescribed species of *Mesadenia* (no. 1164) a few miles south of Leslie in Sumter County.

The following week we started on a more extensive trip to the extreme southwestern part of the state, by way of Americus and Albany. Our first stop on this trip was at Camilla, in Mitchell County, on the 7th and 8th (nos. 1165–1170). The most interesting natural feature in the vicinity of Camilla is the "Slough," which is shown on most maps of Georgia, though I have never yet seen it mentioned otherwise. It is represented on the maps as a body of water about twenty miles long and one or two miles wide, approximately parallel to the Flint River in Mitchell and Decatur counties. But it is not a body of water at all, nor even a swamp. That portion of it which we explored, a mile or two west of Camilla, is simply a broad shallow depression about a mile wide and perhaps ten feet lower than the surrounding country. At the time of our visit there was considerable water in it as a result of recent rains (August being one of the wettest months in that part of the country), but it is said to be ordinarily quite dry for its whole

*Contr. U. S. Nat. Herb. 6: 103, 389. 1901.

length, except in a few holes which are deep enough to hold water throughout the year. The flora of the Slough is not very remarkable. The principal woody plants in it are medium-sized bushes of *Quercus Virginiana*, *Crataegus aestivalis*, and *Diospyros Virginiana*, with *Pinus palustris* in drier places. Among the herbaceous species in the Slough may be mentioned *Sporobolus Floridanus*, *Acerates Floridana*, *Breweria aquatica*, *Diodia teres*, *Chrysopsis graminifolia* and *Rudbeckia Mohrii*. This is very much the same kind of flora as is found around the mayhaw (*Crataegus aestivalis*) ponds of Sumter County. *Nama ovata*, conspicuous with its large bright blue flowers, was the only species found in the Slough which I had not seen elsewhere.

On the 8th we continued our journey as far as Thomasville. The next day was occupied with a trip to the type locality of *Nymphaea orbiculata*, about six miles northeast of the city (nos. 1171–1181). On the 10th we traveled west 21 miles, to Whigham, in Decatur County, in the midst of a topographically and botanically remarkable region. The surrounding country is quite hilly, much more so than that a few miles to the northward, and the forests are composed almost entirely of deciduous trees. Although less than sixty miles from the Gulf of Mexico, one standing in these deciduous forests could easily imagine himself among the mountains 250 miles farther north. Similar conditions prevail near Thomasville, though perhaps not in such marked degree; also at Tallahassee, Florida (which is about thirty miles from Whigham), according to the reports of geologists and botanists who have been there.*

Five or six miles north of Whigham these densely wooded hills terminate and the comparatively level pine-barrens of the Lower Oligocene or lime-sink region are again seen. About seven miles from Whigham is one of the most remarkable lime-sinks in the state. It is known to some geologists as Forest Falls, but the inhabitants of that region call it simply the "Lime Sink." There is a full-page illustration of it with description in Bulletin No. 5 of the Georgia Geological Survey. This lime-sink differs from all others which I have seen in its great depth (about ninety feet) and in containing a waterfall eighty feet high, making it one

* See Nash, Bull. Torrey Club, 23: 96. 1896.

of the most beautiful natural features in South Georgia. I know of no other such waterfall in the entire coastal plain of the eastern United States. The side of the sink opposite the falls is not too steep to allow of an easy descent to the bottom, and we spent a couple of hours at this interesting spot on the morning of August 12 (nos. 1190–1194).

On leaving Forest Falls we walked southwestward toward Bainbridge about nine miles (nos. 1195–1201), to visit a pond which is also illustrated in the bulletin just mentioned. There it is called Fairview Lake, but we found "Open Pond" to be the name in current use in the vicinity. This pond is about half a mile in diameter, and takes its name from the fact that, unlike most of the ponds of the coastal plain, there is no vegetation showing above its surface except a few bushes near the shore. The water is unusually clear, and the shore is sandy, affording a habitat for several very interesting plants (nos. 1202–1206). In all these respects it resembles very much some of the ponds of New England.

Early the next morning we explored another pond about the size of Open Pond and two miles north of it, of which we had been told on the previous day. This latter is known as "Cane Water Pond," and is said to derive its name from the abundance in it of maiden-cane (*Panicum digitarioides*). It is very different from Open Pond, being surrounded by cypress (*Taxodium imbricarium*) swamps and filled with a luxuriant aquatic vegetation. Here we had the use of a boat, so were able to explore the pond somewhat thoroughly (nos. 1208–1213). Cane Water Pond is remarkable for containing a representative of each of our five North American genera of Nymphaeaceae, viz., *Cabomba*, *Brasenia*, *Nelumbo*, *Nymphaea* and *Castalia*. The *Brasenia* and *Nelumbo* are of course the same species as found in the northern states, but the other three genera are represented by different forms which will be mentioned later. The *Nelumbo* is quite rare, but the other four are abundant and their floating leaves together with those of *Limnanthemum aquaticum* serve to cover the surface of the pond very densely, leaving only two or three open spaces a few yards across. Another interesting feature of Cane Water Pond is the presence in it of several floating islands, composed principally of *Triadenum*

Virginicum, *Ludwigia sphaerocarpa*, *Ludwigiantha arcuata*, *Cephalanthus occidentalis*, and a small species of *Eleocharis*. The *Cephalanthus* is probably attached to the bottom, but the other species have no direct connection with the soil.

Around both Cane Water and Open Ponds, and all the way between them, the soil is of the Columbia sands, loose and dry, giving rise to a flora not unlike that of the sand-hills of southeast Georgia. In such situations numbers 1214 and 1215 were collected.

From Cane Water Pond we retraced our steps to Open Pond, followed the road from there toward Bainbridge about two miles, and then went back to Whigham by a different road. Soon after turning back toward Whigham we passed a limited area of very dry white sand, similar to that of the rosemary sand-hills of Emanuel County and containing a few of their characteristic species, which were not seen elsewhere in southwest Georgia (nos. 1216, 1217).

From Whigham I went alone on August 14 to Saffold, in the southwestern corner of Early County, on the Chattahoochee River, and collected along and near the river that afternoon and the next morning (nos. 1218–1232). The banks of the Chattahoochee at this point, about thirty miles from its confluence with the Flint and a hundred feet above sea level, are only about half as high as they are near Omaha, but still quite steep. As they are here subject to occasional overflow the flora is rather different from that farther up. *Rhus copallina*, *Aralia spinosa* and *Bumelia lycioides*, species which elsewhere are usually shrubs, here become truly arborescent. Specimens of *Aralia* with trunks six inches in diameter and twenty-five feet tall and of *Bumelia* eight inches thick and about fifty feet tall were observed.

There are several small lime-sinks between the station and the river, though this is very near the inland edge of the lime-sink region. A short distance north of the station is a rather remarkable feature for this part of the state, a steep rocky wooded hillside, sloping toward the river, with of course a rather peculiar flora. The outcropping rocks, which are very hard and siliceous, are clothed with mosses and lichens, and *Asplenium platyneuron* grows in their crevices, just as it does in the mountainous parts of the

state. Among the flowering plants inhabiting this hillside are *Dioscorea, Hydrangea quercifolia, Cercis, Phaseolus polystachyus, Erythrina herbacea, Viola villosa, Yeatesia, Polymnia Uvedalia* and *Melanthera hastata.* Some fragments of the rock from this place have been identified by means of their fossils as Lower Oligocene.

About noon on the 15th I went back thirty miles over the same route I had come the day before, to West Bainbridge, where I collected numbers 1233–1238 in the Columbia sands along the Flint River, and during the afternoon I traveled forty miles northward on the Georgia Pine Railway through Miller and Early Counties to Arlington, in Calhoun County (nos. 1239, 1240). Arlington seems to be in the same pine-barren zone as Leslie, but on account of a heavy rain the next morning I was not able to study carefully the similarity of the floras. On the afternoon of the 16th I continued my journey to Albany, where I had a few hours to wait, so I went out across the Flint River to have a look at the flora and geological features, but did no collecting because this locality had been already pretty well explored by Dr. Chapman, Dr. Small and other botanists.

From Bainbridge, at the coastward edge of the lime-sink region, to Sumter County, at its inland edge, the flora of the banks of the Flint River does not seem to vary much, and all the species seen at Albany were the same as those already seen elsewhere. From Albany I went to Cordele, crossing the Flint River at still another place, where it forms the boundary between Lee and Worth Counties, and returned to Leslie the morning of August 17.

Ten days later I started for the metamorphic region, going by way of Richland and Columbus. At the latter place I crossed the Chattahoochee River to examine some of the geological features of the fall-line (the inland boundary of the coastal plain). On the morning of August 28 I left the coastal plain and went up to Woodbury, in Meriwether County, near the Flint River, 51 miles from Columbus, where I stopped two days (nos. 1249–1273).

The most noteworthy natural feature in the vicinity of Woodbury is the range of Pine Mountains, which extends approximately east and west through the counties of Harris, Meriwether, Talbot and Upson. These are the southernmost mountains in the eastern

United States, but they are rarely shown on maps and are very little known outside of their immediate vicinity. The only measurement of their altitude which I can find was made some years ago over G. M. & G. R. R. tunnel thirteen miles below Woodbury, and is 1,148 feet. This range passes within two or three miles of Woodbury, where the Flint River cuts through it in a narrow gap or gorge about 400 feet deep. Most of my collecting among the Pine Mountains was done in the vicinity of this gap, in Meriwether and Upson Counties. The mountains are very steep, especially in the vicinity of the river, where they rise abruptly from the water's edge with a slope of about 45°. The

FIG. 3. Pine Mountains near Woodbury, showing gap of Flint River; looking southeastward from an isolated peak near the river. Aug. 29.

rock of which they are composed is a hard sandstone, which gives rise on disintegration to a very sandy soil, supporting a flora which is quite different from that of eastern Middle Georgia and resembles in many ways that of the coastal plain.

These mountains take their name from *Pinus palustris*, which is abundant all over them, often attaining as large dimensions as in the pine-barrens of South Georgia. Its occurrence here is not mentioned in even the most recent publications of the state agricultural department, and was therefore entirely unexpected. I

heard of a few sawmills in operation among these mountains, but saw little evidence of their work. The flora of the dry southern slopes of the mountains is not unlike that of some of the dry pine-barrens 100 miles farther south, being characterized by such species as *Andropogon furcatus*, *Paspalum bifidum*, *Cyperus retrofractus*, *Yucca filamentosa*, *Agave Virginica*, *Quercus Catesbaei*, *Ceanothus Americanus*, *Crotalaria rotundifolia*, *Indigofera Caroliniana*, *Cracca Virginiana*, *Stylosanthes biflora*, *Vaccinium arboreum*, *Asclepias verticillata*, *Vernonia angustifolia* and *Chrysopsis graminifolia*. On the shaded northern slopes however many Alleghanian species are met with, such as *Dryopteris Noveboracensis*, *Uvularia perfoliata*, *Polygonatum biflorum*, *Trillium stylosum*, *Quercus rubra*, *Castanea dentata*, *Magnolia Fraseri*, *Heuchera Americana*, *Robinia Pseudacacia* and *Antennaria solitaria*. Along the banks of the river at the base of the mountains two species which are usually confined to the swamps of the coastal plain, *Nyssa uniflora* and *Cyrilla racemiflora*, are quite common at 650 feet altitude, the latter sometimes growing on rocky cliffs with *Kalmia latifolia*. The former extends up the river to Pike County.

Near Woodbury, at about 775 feet altitude, are some bogs with a flora much like that of similar places around Americus, containing such lowland species as *Lycopodium pinnatum*, *Cyperus Haspan*, *Eleocharis tuberculosa*, *Rhynchospora axillaris*, *Juncus trigonocarpus*, *Polygala cruciata*, *Rhexia Virginica*, *Eryngium virgatum*, *Gratiola pilosa* and others which will be mentioned later. On the 29th I went over into Pike County a few miles, and collected a few plants in a similar bog at about the same altitude, which contained besides some of the species just mentioned *Scleria trichopoda*, *Rhexia ciliosa*, *Cynoctonum sessilifolium*, *Viburnum nudum*, *Eupatorium verbenaefolium* and *E. rotundifolium*.

On the 30th I proceeded to Griffin, twenty-nine miles farther, noticing on the way that *Pinus palustris* extended up into Spalding County to within a few miles of Griffin. One species was collected in the woods near the Experiment Station that afternoon.

The next day I went by way of McDonough up to Atlanta, where I rejoined my brother. On September 3, we were at College Park, making collections in that vicinity, in the southern edge of Fulton County and adjacent portions of Campbell (nos. 1275–

1283). Two days later we went up to Dalton, from which point we made only one excursion before leaving the state, collecting numbers 1284–1292 on the Oostanaula Shale about two miles east of the city.

The number of days which I spent in Georgia in 1901 was the same as in the previous year, and although not so many specimens were collected, more was accomplished in other ways. My travels by rail within the state covered about 1,380 miles, and as about 98 per cent. of this distance was traversed in the daytime, I was able to make observations on the flora of nearly every mile traversed. I collected in twenty-four counties, and made notes on the flora of seventeen others. Over 100 photographs illustrating my observations were taken.

Among the noteworthy results of my trip may be mentioned the re-discovery of *Elliottia racemosa*,* the finding of inexhaustible quantities of *Isoetes* in the coastal plain of Georgia, where none had been known to exist before, and the exploration of the sandhills of southeast Georgia, the Cretaceous region, the Slough, Forest Falls, the ponds of Decatur County, and the Pine Mountains.

Dr. Mohr's "Plant Life of Alabama," which appeared during the summer, was a great help to me in several ways, giving me an opportunity to compare the floral conditions in Georgia with those of the corresponding portions of Alabama; and it was a source of considerable satisfaction to note how nearly his treatment coincided with that which I had already planned for Georgia.

Some of the undescribed or otherwise noteworthy plants collected on this trip will be discussed in the concluding portion of this paper.

COLLEGE POINT, N. Y.

*See Plant World, 5: 87–90. *pl. 12.* My 1902; also Sargent, Silva N. Am. 14: 31. 1902.

The Polyporaceae of North America.—IV. The Genus Elfvingia

By William Alphonso Murrill

The mycological field of Europe is small as compared with that of America. The European mycologist has in general a small country with limited variation in altitude, geological formation and season, as well as a limited number of host plants, few of which are readily attacked by wood-loving fungi; hence it is possible to know more minutely the forms that do occur and to segregate varieties according to host, position and other details of which little note has yet been taken in America. The confusion of forms in Europe is largely due to former difficulties in travel, limited means, lack of interest in the work of others and lack of generalization, a condition of affairs accounted for to some extent by difference in language and the antipathy common among neighbors. Upon receiving an exotic plant, be it from Guinea or Greenland, the mycologist of limited outlook makes a heroic effort to correlate it with some species growing in his immediate vicinity and, failing to do this, either loses interest altogether in the matter or half-heartedly looks up a name for it in some foreign flora. To send American fungi abroad for determination is usually to be either disappointed or deceived. To many European botanists, Kew is a very foreign country and America is off the map.

One should not be surprised to find, therefore, that many American plants are parading under false names and that many are entirely new to the botanical public; and what is true of species is likewise true of genera; the old molds must be recast and several new ones added to accommodate these large additions. For our northern forms, the work of recasting has been largely done by Dr. P. A. Karsten, of Finland, who has to deal with a local flora very similar to our own in its lines of cleavage, although the abundance of species present in our latitude is unknown in Finland. The basis of this similarity between North American and North European and Russian genera is found in the fact that these countries have been practically continuous so far as distribution is concerned, whereas the continents of the southern hemi-

sphere have very probably been for ages widely separated by impassable barriers of open sea. The principles above enunciated are well illustrated in the genus *Elfvingia* of Karsten, a discussion of which follows.

ELFVINGIA Karsten, Findlands Basidsv. 333. 1889

This genus was described by Karsten as follows:

"Hatten beklädd med en spröd, skorpartad hud, glatt. Cystiderna föga anmärkningsvärda. Basiderna n. klotrunda, 4-sporiga. Sporerna äggrunda, värtfulla, gulbrunaktiga."

The only representative of the genus in Finland, according to Karsten, is *Elfvingia applanata* (Pers.) Karst., a species first described as *Boletus Lipsiensis* by Batsch (Elench. Fung. **2**: 183–185. *pl. 25. Fig. 130. a, b.* 1786), then as *Boletus applanatus* by Persoon (Obs. Myc. **2**: 2. 1799), and later as *Polyporus merismoides* by Corda (Sturm, Deutschl. Flora, **3**: 139–142. *pl. 63.* 1837). Its close relationship to *P. fomentarius* L. may be judged from the fact that Persoon in his Synopsis treats it as a variety of the latter plant, although he had described it as a distinct species only two years before. In the present treatment of the genus *Elfvingia*, **E. Lipsiensis** (Batsch) will not appear, since it does not occur in America, its place being taken by *E. megaloma* (Lév.).

Synopsis of the North American Species

1. Context ferruginous, spores hyaline, pileus usually ungulate. 2.
   Context darker, fulvous to chocolate-brown, spores yellowish-brown, pileus usually applanate. 3.
2. Pileus exactly ungulate, pores 3 to a mm., growing in temperate regions south to Carolina. 1. *E. fomentaria.*
   Pileus compressed ungulate, pores 5 to a mm., growing in tropical America and the gulf states. 2. *E. fasciata.*
3. Hymenophore annual, persisting above later growths; pileus reniform, margin thin, spores dark brown, roughly echinulate, 8–9 × 7 μ. 3. *E. reniformis.*
   Hymenophore truly perennial, tubes stratified, spores smooth or nearly so. 4.
4. Crust white, becoming brown, not separating, spores smooth, 8–9 × 5 μ, growing in temperate regions. 4. *E. megaloma.*
   Crust brown, context floccose, softer, spores smooth or slightly echinulate, growing in tropical America. 5.
5. Pileus thick, crust smooth and very hard, hymenium plane, margin truncate, very smooth, often laccate, context very thin, spores smooth or slightly verrucose, 7–9 × 5–6 μ. 5. *E. tornata.*
   Pileus thin, crust radially wrinkled, thinner, hymenium concave, margin undulate, never laccate, spores smooth, 8 × 5 μ. 6. *E. Lionetii.*

1. **Elfvingia fomentaria** (L.)

Boletus fomentarius L. Sp. Pl. 1176. 1753.

Boletus ungulatus Bull. Herb. France, *pl. 491. fig. 2, C. D. E.*

Polyporus fomentarius Fr. Syst. **1**: 374. 1821.

Fomes fomentarius Gill. Champ. Fr. **1**: 686. 1878; Icon. 467.

See also Sowerby, Engl. Fungi, *pl. 133*, and Schaeffer, *pl. 137*.

This fungus is widely distributed on birch and beech in the temperate regions of Europe and North America. It varies little in shape and appearance in the north, though very small forms occur in high latitudes. One of these brought from the Isle à la Crosse by Dr. Richardson was described by Berkeley as var. *excavatus* (Ann. Nat. Hist. **3**: 387. 1839). The type specimens at Kew agree in all respects with *P. fomentarius* as it grows in the Adirondack Mountains and in Sweden. A more southern form, larger, thicker, more uniform and ashy in color, is known in Europe as *Polyporus Inzengae* De Not., but as this does not occur in North America it need not be discussed at present. When fruit-bodies of *P. fomentarius* become old and indurated and lose their outer pellicle the horny crust takes a high ivory-black polish and is very different from the usual covering of the plant. It is this form that has frequently been mistaken for *P. nigricans* Fr. At Kew, *P. igniarius* and *P. applanatus* have been variously confused with *P. fomentarius*.

In addition to the usual European and American exsiccati, all of which contain this species, material has been examined from Germany (Magnus), Sweden (Murrill), France (Patouillard), Finland (Karsten), Italy (Bresadola), Scotland (Klotsch), Canada (Macoun), Maine (Ricker), New Hampshire (Miss Minns), Massachusetts (Mrs. French), Wisconsin (Baker), New York (Underwood), Connecticut (Miss White), and most of the other states south to North Carolina and west to California.

2. **Elfvingia fasciata** (Sw.)

Boletus fasciatus Sw. Prod. 149. 1788; Fl. Ind. Occ. **3**: 1921. 1806.

Polyporus fasciatus Fr. Syst. **1**: 373. 1821.

Polyporus sclerodermeus Lév. Ann. Sc. Nat. Bot. III. **5**: 129. 1846.

Polyporus marmoratus Berk. & Curt. Proc. Am. Acad. **4**: 122. 1858.

Fomes fasciatus Cooke, Grevillea, **14**: 21. 1885.

Specimens examined: Ellis & Everhart, N. A. Fungi, no. 1702; Florida (Martin, Calkins, Rolfs, Lloyd, Rau), Louisiana (Langlois), Alabama (Underwood, Earle, Baker), Texas (Egeling), Jamaica (Earle).

This plant is fairly abundant in tropical America, being known from nearly all localities that have been explored. Earle found it at three different points in Jamaica growing on *Cedrela* and cocoanut logs. It replaces *E. fomentaria* in the south, but cannot be confused with it as some have supposed.

3. **Elfvingia reniformis** (Morg.)

Polyporus reniformis Morg. Jour. Cincinnati Soc. Nat. Hist. **8**: 103. 1885.

Fomes reniformis Sacc. Syll. **6**: 187. 1888.

Collections examined: Ohio (Morgan), Kentucky (Miss Price), Indiana (Underwood), Virginia (Murrill, Mrs. Murrill), North Carolina (Memminger), Alabama (Underwood, Earle), Louisiana (Langlois).

When first sent to Kew this plant was determined as *P. applanatus* Pers., a closely allied European species. Later it was placed by Cooke under *P. incrassatus* Berk., a plant indigenous to Australia! It may be said, however, that the specimens now at Kew are not fairly representative even of the form and much less of the habit of Morgan's species. The following extract from one of D. L. James' letters written in 1882 refers to the peculiarities of *P. reniformis*: "I am rather surprised at my fungus turning out to be *P. applanatus*. It grows at the foot of old oak stumps and trees and seems to be an annual, the previous year's growth being found distinct and above the new growth in a decayed condition. The pileus does not harden as in *P. applanatus*." By *P. applanatus* is, of course, meant our ordinary species, *P. megaloma* Lév. "Again, the hymenial surface instead of being flat, is curved upwards in every case, this feature being well shown in the specimen sent.

However, your experience I shall certainly hold above my ignorance."

During a recent trip through the southwestern part of Virginia, I found this fungus very common on stumps and decaying trunks of oak. In every case the fruit-bodies of previous years were dead, with the later growths below. I have specimens taken from a white oak trunk on which I saw the first fruit-bodies two years ago and some of these have three layers, some two and some one, only the last year's growth in each case being alive. This corroborates James' testimony to his belief that the fruit-bodies are annual. During the same trip, I collected a few specimens of *E. megaloma* on its usual hosts and noted with interest that the two species are as distinct in Virginia as they are farther north. Facts thus far collected indicate that *E. reniformis* is a southern form and confined to a much more restricted area than *E. megaloma*, while within this area it is often abundant and quite destructive to the oak, its favorite host.

4. **Elfvingia megaloma** (Lév.)

Polyporus megaloma Lév. Ann. Sc. Nat. Bot. III. **5**: 128. 1846.

Polyporus leucophaeus Mont. Syll. Crypt. 157. 1856.

Fomes megaloma Cooke, Grevillea, **14**: 18. 1885.

Ganoderma leucophaeum Pat. Bull. Soc. Myc. **5**: 73. 1889.

Specimens have been examined from New York (Shear, Murrill), Canada (Anderson), Pennsylvania (Ellis), Virginia (Miss V. W. Murrill, Murrill), and nearly all the other states west to California and south to Georgia. The plant occurs abundantly on dead or dying wood of oak, sweet gum, poplar and other deciduous trees. In the popular mind it is associated with etching because its hymenium changes to a darker color when bruised. Owing to the close resemblance to *P. applanatus* Pers. in habit and appearance, it has been generally known under that name among American mycologists. The correct name for it, however, appears to be that assigned to it by Léveillé in 1846 on receiving specimens collected by Ménand in New York. In connection with his description, he notes that it is near *P. applanatus* in form, consistency and volume, but differs essentially in the color of the

cap and the pores and especially in the presence of a wide sterile border circumscribing the tubes below.

5. **Elfvingia tornata** (Pers.)

Polyporus tornatus Pers.; Gaud. Voy. Freyc. Bot. 173. 1826.
Polyporus australis Fr. Elench. 108. 1828.
Fomes australis Cooke, Grevillea, **14**: 18. 1885.
Ganoderma australe Pat. Bull. Soc. Myc. **5**: 71. 1889.
Scindalma tornatum Kuntze, Rev. Gen. **3**: 517. 1898.

Described from islands in the Pacific ocean and apparently of general occurrence throughout tropical America, since most of the collections from that region contain specimens of it. A large plant was collected last year by Percy Wilson in Porto Rico, and Earle on his recent visit to Jamaica found it at three different stations; at Port Maria on a dead limb of a leguminous tree, at Hope Gardens on a dead deciduous trunk and at Port Antonio on the stump of a hog plum and the fallen trunk of a cocoanut palm.

6. **Elfvingia Lionetii** (Rolland)

Ganoderma Lionetii Rolland, Bull. Soc. Myc. **17**: 180. *pl. 8*. 1901.

This plant was collected by M. Lionnet on trunks in the isthmus of Panama. It is closely allied to *E. tornata*, but is thinner with a thinner crust, which is usually profoundly wrinkled from the center outward. The context is floccose, elastic, brownish-rufous, and the spores ovoid, smooth, fulvous, 8 x 5 μ. Several specimens are in the New York Botanical Garden collected by C. L. Smith in Nicaragua.

NEW YORK CITY.

The Desert Flora of Phoenix, Arizona

By Richard E. Kunzé

The Sonoran flora of the Salt River Valley of Arizona, between Phoenix and Tempe, during December, January and February of each year presents such a strong contrast to that of the north, that a description of it as seen after the autumn or winter rains may not be out of place. This valley has an altitude of 1,100 feet above the sea, is about sixty miles long and has a width of nearly twenty miles. It once was an inland sea, and the red sand buttes, largely composed of conglomerate rock, plainly show the effect of erosion on every side. From east to west this valley is traversed by the Salt and Gila rivers. To the north it is bounded by the Phoenix mountains, and to the south by the Maricopa mountains, running east and west, and the Estrella mountains, westward. In various places sandstone buttes jut out from the mountain into the valley.

At the beginning of December, when the deciduous shrubs and trees of the bottoms defoliate, those of the deserts adjoining put on a verdure which lasts until the succeeding spring. The cactus desert proper extends only from two to four miles on every side of these mountains, changing then into the sagebrush desert, which in turn is bounded by the bottom lands of the rivers. The striking feature of the Sonoran flora is the giant cereus or "saguara" of the Mexicans, *Cereus giganteus*, reaching here a height of forty feet and over. In April and May this *Cereus giganteus* has large white flowers, which appear at the end of candelabrum-like branches, and arranged in crescentic rows encircling the stem, to the number of fifty and seventy-five on a single stem. In July the scarlet fruit appear, which are luscious and are gathered by Indians and Mexicans to be made into jelly and sweetmeats, or eaten raw. A wine is obtained from it by fermentation.

Echinocactus Wislizeni or fishhook cactus, is here found in the crevices of the rock. It more largely affects the mountain sides or rocky "arroyos," which carry the waters to the bottoms. A

few are scattered among the sagebrush, *Artemisia tridentata* and another species, growing in a sandy loam; these cacti sometimes attain a barrel-shape, weighing from 150 to 200 pounds each. Such individuals, however, are rare. The flesh of this cactus is by Mexicans made into candy, much like the sugar-coated calamus or sweet flag. Parched travelers of our deserts often cut open large plants of *E. Wislizeni* to suck the moist pulp, when water-holes cannot be reached or found. The yellow flowers appear in May and often again in September, for a second time, followed by a yellow fruit, dry and insipid.

Another species, *Echinocactus Emoryi*, or barrel cactus, is sparingly found in this valley, and occurs in preference on sandy sagebrush desert. The large central spines of *E. Emoryi* are not of such a bright roseate color as those of *E. Wislizeni* but fully as formidable. The flowers of *E. Emoryi*, which are red, are succeeded by a yellow fruit, also dry and insipid. This species is found farther south, in Sonora, Mexico, more abundantly than in Arizona. Another very spinose cactus found on this desert is *Echinocereus Engelmanni*, growing in clumps of from two to twenty joints, as thick as one's arm, and a foot in length. In April it is covered with many large, fragrant, roseate flowers. Near by and generally under cover of a sagebrush or other plant, is seen the pretty cinereous *Cactus Grahami*. Individuals of single joints grow to the height of eight inches, but more frequently a number are growing from a common base, covered by many fragrant little flowers in May, if not earlier; color, light roseate, with a white stripe in center of each petal. The small red fruit, naked and elongate, is quite persistent. This cactus flowers a second time after the July rains, if such occur. During the season of drouth in 1900, when we had only three good rains in twelve months, this *Cactus* prolonged its second time of flowering until a late November rain, and at Christmas time it was in full bloom on the Phoenix desert. A goodly number of *Covillea Mexicana*, the evergreen greasewood or creosote bush, was also blooming there for the second time. Both of these plants, in lateness of flowering, vie with our garden roses and chrysanthemums.

Of *Opuntia*, several species occur in this vicinity, of which the

most noteworthy is the arborescent prickly pear, *Opuntia arborescens*, with its color variations. These plants grow from three to five feet high, have twisted joints, and may be found in any soil from comminuted granite to sandy loam. The flowers are eaten by several beetles, so that frequently very few perfect flowers are seen on a plant. Plants having flowers of magenta color represent *O. arborescens*, and the plant usually is known as the candle cactus. Another plant, with reddish-crimson flowers, is *O. arborescens versicolor*, which is also called candle cactus. *Opuntia Whipplei spinosior* has greenish-yellow flowers, and the branches are fortified with long and stout spines.

Opuntia Bigelovii is the dreaded "cholla" of the Mexicans. Its branches are thickly covered by long, barbed and sheathed spines, whitish and pendulous on large plants. These break off readily and adhere to clothing; the ground all around is covered with these spines, and woe to the unlucky one treading on them with any but the heaviest of shoes. The pain is greater in withdrawing the spine than when they enter the flesh. Plants grow from two to twelve feet high or higher. Cowboys wear stout leather leggings to protect their limbs against the cholla. The flowers are greenish and the fruit greenish-yellow. A very slender *Opuntia* growing along the arroyos of our desert is *O. leptocaulis*, two feet high, with long stems of the thickness of a stout pencil. It has greenish flowers, succeeded by very small scarlet fruit, of strawberry shape, which remain long on the stem and look pretty. This plant grows in thick bunches. *Opuntia Engelmanni*, a plant of spreading habit, is found on the edges of the Phoenix desert, near the foothills. Its large ovate joints bear yellow flowers, and a large scarlet fruit the size of a pullet's egg. The latter is edible, refrigerant and yields a fine jelly. Animals, birds and even mankind resort to this fruit when provisions give out.

Cereus Greggii, our only night-blooming *Cereus*, is found sparingly on the sagebrush desert. Its flower is salvershaped, white and fragrant, over five inches in diameter. It seldom fruits; the fruit is in shape like a miniature torpedo, scarlet and containing many black, flattish seeds. The root grows to very large size, and is fleshy like a beet. It is called by Indians and Mexicans the "Montezuma yam." I have dug up plants with a root

two feet long, weighing from ten to fifteen pounds each. It will do best in a very sandy loam. Natives make use of this root for burns and other inflamed surfaces, cutting off a slice from a growing plant, and applying it to the affected parts. The stems do not grow very long, from two to four feet at most. Usually these plants grow under a mesquit tree or beside a tall sagebrush, to shelter the slender stem from the force of our wind or sand-storms. The stem is from one half to one inch thick, four- or five-angled, bluish-green and short-spined. I obtained fruit by cross-fertilization in the garden.

Other striking plants of our desert are two species of "palo verde," of which one is *Parkinsonia microphylla*, scattered all over the barren soil, and growing out of crevices of the rock like a succulent. It is not a large tree, and being hard in texture, it is much used for firewood. The leaves appear late in autumn or after the winter rains, and drop in April, when the tree is covered by panicles of yellow flowers, attracting many insects. The hard seeds are shelled out by birds, and the bark is gnawed off by the lemur-like desert squirrels and rodents. The pinnate leaves of this species have leaflets not larger than the head of a pin. This tree grows on the mesa as well as on mountains.

Parkinsonia Torreyana is a much handsomer tree, and its leaves, much larger than those of the preceding species, also appear at the approach of winter. The branches are more graceful; they are pendant, and when covered by the large yellow panicles of flowers early in April present a gorgeous appearance. This species affects the arroyos or watercourses more than the other. Young trees are quite bushy in shape. The branches of all Parkinsonias are prickly. The seeds of *P. Torreyana* furnish food for birds, and its flowers bread for bees.

Acacia Greggii is another very prickly desert bush, which in sheltered situations retains its small leaves all winter. In May it is covered by small, yellow, fragrant flowers furnishing fine bee-food. The branches having hooked thorns, it is known as the cat-claw acacia, and is much dreaded. It bears twisted brown flat pods. Its height is from five to ten feet.

Covillea Mexicana, or creosote bush, is the commonest evergreen shrub of the cactus desert, growing from four to ten feet

high. Its branches are covered with a reddish-brown resin, which gives them a peculiar odor resembling creosote. A few beetles and plant-bugs resort to the yellow globose flowers which cover the bush in April. Later in autumn, after the rains, it flowers a second time, and it is then that the new foliage looks the best and remains so during the winter months. It imparts to the desert a lively green. By Mexicans it is used when planted young and trimmed like boxwood as a hedgeplant around graves. It is likewise medicinal. A tincture prepared from the fresh twigs is useful for sore throat, possessing astringent and antiseptic properties. A decoction is used for itching hemorrhoids, and also as a good wash for itching on any part of the body. Ranchers use a decoction to heal sores and foul ulcers on live stock.

Olneya Tesota is a leguminous tree growing generally along the desert ravines or arroyos, and furnishes next to mesquit the best fuel of this region. Mexicans call it "arbol del hierra" or ironwood. It is very thorny throughout and often grows to the height of twenty or thirty feet. The grayish-green color of its pinnate leaves is quite in contrast with the brighter green of other evergreen shrubs or trees of the desert. In the month of May the branches are loaded down with racemes of lavender and brownish-purple flowers, fragrant and much visited by bees. It is one of the few trees furnishing shade to freighters and travelers of the Arizona desert.

Lycium Fremontii, or squawbush of the prospectors, is quite an ornamental shrub of the outskirts of our cactus desert. From late in December until March it is thickly covered with fleshy, dark green, obovate small leaves, much resembling those of a *Sedum* or some species of *Mesembryanthemum*. After a frosty night the leaves present a crystalline appearance like an ice-plant. The shrub is thickly branched, and from three to six feet high, presenting a somewhat spherical shape. Its small, tubular, violet flowers are of the same length as the scarlet obovate fruit, and are rifled by many bees. It is the first bee-food of the season and of much value to the apiarian. Flowering and fruiting for several months in succession, this shrub is quite ornamental as well as useful. The berries have demulcent, slightly subacid properties and are eaten by birds as well as boys. Chickens feed on the succulent leaves. During the hot season this shrub is dormant, but

after the rains of August, should there be any, it is again clothed in verdure, flower and fruit. Such is the case with many Arizona plants of the Sonoran flora.

Holacantha Emoryi, the crucifixion thorn of Mexicans, although not an evergreen shrub in the strict sense, being leafless and the thorniest of ugly thorns, is nevertheless green the year round. Every branch is clothed with sharp rounded thorns from one to four inches long. Its clusters of orange and red flowers closely attached to the axils or bifurcation of the thorns, appear in May and June, followed by fruit in July and August. Flowering branches are preserved for the use of tourists, and offered for sale in the curio shops of Arizona. The size and thickness of the thorns remind one of *Gleditsia triacanthos*. This shrub grows from two to six feet or more in height.

Artemisia tridentata, the well-known sagebrush of the desert, with the minute grayish-green leaves, attracts much less attention in appearance than size. It grows from three to eight feet or more in height according to soil. In the more sandy parts of the desert, it provides shelter for many tender if not more useful plants. The small *Cactus Grahami* thrives in its shade, and the slender, fragile branches of *Cereus Greggii* find a support growing through its mass of slim branches.

Another *Artemisia*, apparently undescribed, is much handsomer, of a brighter green color and with large leaves. It affects the region of the cactus, growing in more rocky and sandy soil. Its height is from one and one half to two and one half feet.

Ephedra trifurcata, or "cañatilla" of the Mexicans, is a strange looking shrub, leafless and with sheathed branches like *Equisetum*. Its branches are closely crowded, of the thickness of a straw or less, and of a grayish-green color. It is a shrub from three to five feet high, and very many stems are given off from a common root. It affects the arroyos and swales of the desert in preference to drier situations. The Mexicans use this plant extensively in the form of decoction for specific urethritis, and hold it in high esteem. *Ephedra antisyphilitica*, a closely allied species found nearer to the Mexican boundary and further south, is also much used in Mexico for similar purposes and as a diuretic. This plant is two feet in height.

PHOENIX, ARIZONA.

New Species from the Pacific Coast.—I

By Edmund P. Sheldon

Cheiranthus Pacificus Sheldon sp. nov.

Perennial, slender, erect, 3–6 dm. high, usually simple, sometimes branched above and rarely several-stemmed from the somewhat woody base after the first year: stems green or slightly purplish at the base, slightly 6–9-angled above, the angles becoming mere lines below, pubescence short, appressed: leaves lanceolate, 1-nerved, narrowed to a sessile, subclasping base, entire to remotely runcinate-toothed, acuminate at the apex, pubescence appressed, once or twice forked: inflorescence subcapitate, eventually developing into a lax raceme of erect or divergent pods: sepals 5–6 mm. long, the outer often 2–3-toothed at the apex: petals relatively small, 6–12 mm. long, yellow: pods 5–10 cm. long, quadrangular, acute or short-acuminate at the apex, the persistent stigmas small, and but slightly lobed: seeds lenticular, with a hyaline wing at one end.

This species has hitherto been referred to *C. asper* Nutt., but its relationship is rather with *C. inconspicuus* Greene and *C. angustus* Greene.

A study of the seeds of the species of *Cheiranthus* in the Herbarium of the California Academy of Sciences seems to show that those of *C. asper* and its near relatives are quadrangular and truncate at one end, often apiculate on the other. The present species is characterized by lenticular seeds with a wing-like appendix.

The present known range of this plant is from northern Oregon to southern California.

The type is my no. 11008 from Multnomah Falls, Multnomah Co., Oregon, July 27, 1902. I found it in abundance on open, exposed banks near the Columbia River. It is also represented in the Herbarium of the California Academy of Sciences by the following specimens: Hornbrook, Siskiyou Co., Calif., *Curran;* Santiago Creek, Orange Co., Calif., *Agnes Bowman;* Salt Creek, Tulare Co., Calif., *A. Eastwood;* Ketten Pum, Trinity Co., Calif., *Blankinship;* Mt. Tamalpais, Marin Co., Calif., *A. Eastwood;* New Idria, San Benito Co., Calif., *A. Eastwood;* Dunlap, Fresno

Co., Calif,, *A. Eastwood;* San Bernardino, Calif., *Parish Bros.* no. 61.

Nemophila mucronata Eastwood sp. nov.

Stems decumbent, 1–1.5 dm. long, branched from the base, flat, winged, glabrous, with internodes 2–3 cm. long: leaves 3–5-lobed, with blades about as long as the broad petioles, together 1–2.5 cm.; lobes oblong, mucronate, upper surface bright green, clothed with fine hairs which are papillate at base, lower surface paler, margin inclined to be revolute; petioles broadening, with clasping ciliate base: flowers axillary: peduncles longer than the leaves, glabrous, winged, curved downwards in fruit: calyx with appendages half the size of the triangular divisions, both with appressed hairs on both sides, ciliate, mucronate: corolla tubular-campanulate, apparently white, the rounded divisions 2.25 mm. broad, 4 mm. deep: filaments ribbon-like, narrowing upwards, one half as long as the corolla, inserted above the base: anthers dark brown (?), mucronate: corolla-appendages consisting of two small ciliate folds on each side of the filaments: capsule suborbicular, 5 mm. in diameter: seeds (immature) with prominent caruncle.

This is nearest *N. micrantha* Eastwood, from which it differs chiefly in the mucronate lobes of the leaves, calyx divisions and anthers, as well as a slight difference in the form of the corolla appendages. Collected at Chenowith Creek, Wasco Co., Oregon, by Mr. Edmund P. Sheldon, April 25, 1902, being no. 10204 of his collection.

Aster mucronatus Sheldon sp. nov.

Erect, 9–12 dm. high: stem minutely pubescent above, glabrous below: leaves linear, sessile, acute or acuminate with mucronate somewhat calloused tips, smooth beneath, scabrous with short appressed hairs above, becoming glabrate, entire or remotely denticulate with small appressed teeth, margins scabrous; those of the stem 2–8 cm. long, those of lateral branches 1–2 cm. long: inflorescence loosely subpaniculate, the lateral branches often leafy: heads 2 cm. broad; involucral bracts spatulate, foliaceous, with scarious base and margins, slightly glandular, with acuminate mucronate tips, especially the outer and broader ones; rays linear strap-shaped, slightly erose at the apex: pappus 1 cm. long: achene pubescent.

Near to *Aster hesperius* Gray, a species of Arizona and New Mexico.

This plant was found in abundance around the edge of upland meadows near Mt. Scott, Multnomah Co., Oregon, Aug.–Oct. 1902, no. 11171.

Aster umbraticus Sheldon sp. nov.

Erect, stems slender, glabrate, purplish, simple, often several from the same root, 15–30 dm. high: leaves thin, sessile, glabrous, the margins scabrous, lanceolate, acuminate, divergent, dentate, with small remote salient teeth, or entire, becoming smaller above: inflorescence loosely paniculate, the heads 2 cm. broad, singly terminating the slender branchlets: involucral bracts acute, 2 cm. long, green with scarious margins; rays linear strap-shaped, lilac: achene very small, brownish, glabrous.

Nearly related to *Aster foliaceus* Lindl., but different from any of the numerous varieties of that species.

This plant grows in semi-shaded places along the banks of the lower Willamette River. The type is from University Park, Multnomah Co., Oregon, Sept. 14, 1902, no. 11310.

Artemisia arachnoidea Sheldon sp. nov.

Perennial: stems 6–12 dm. high, from a somewhat woody base, simple or sparingly branched, striate, arachnoid with long loose hairs: leaves scattered, lanceolate, acuminate, sessile, smooth above, arachnoid beneath, entire or the lower irregularly laciniate-lobed with 3–4 divergent acuminate lobes: infloresence paniculate, subsecund, with slender branches 3–10 cm. long, upon which are scattered the short pedicellate heads: heads borne singly or in pairs, subtended by minute bracts: involucre broadly campanulate, the bracts slightly arachnoid, becoming smooth, scarious with a green center: flowers all fertile, light yellow, brownish in drying: receptacle glabrous.

This species is nearest to *Artemisia elatior* (T. & G.) Rydb. The subsecund loose inflorescence and peculiar involucral bracts are characteristic. It was collected on the sandy banks of the Columbia River, one mile west of Vancouver, Washington, Aug. 31, 1902, no. 11284.

Agoseris maritima Sheldon sp. nov.

Perennial from a simple or rarely branched caudex which is buried in the sand, and emits an orange yellow juice when bruised: leaves clustered at the top of the caudex 0.75–1 dm. long, spatulate, mucronate, remotely dentate, sparsely short-pubescent, becoming glabrate, the narrowly margined petioles slightly enlarged and scarious at the base: peduncles as long as the leaves when in flower, twice as long when in fruit, striate near the top, slightly pubescent with loose hairs: involucral bracts green,

blotched or spotted with purple, with a purple median line, slightly pubescent, the outer oblong, obtusely mucronate, the inner twice the length of the outer, lanceolate, acuminate : corollas yellow, slightly exceeding the involucre, the outer row with longer, purple blades : achenes brownish, 10-ribbed, 5 mm. long, tapering to a slender beak of equal length : pappus dull white, 5 mm. long, receptacle flat, areolate, with a short persistent chaff.

This species is perhaps near to *Agoseris apargioides* (Less.) Greene. But a study of that species as it occurs in the vicinity of San Francisco, convinces me that it is entirely different. The reddish-orange juice and paleaceous receptacle are noteworthy.

Abundant on the sand dunes of Clatsop Beach near West, Clatsop Co., Oregon, Aug. 21, 1901, no. 11250.

PORTLAND, OREGON.

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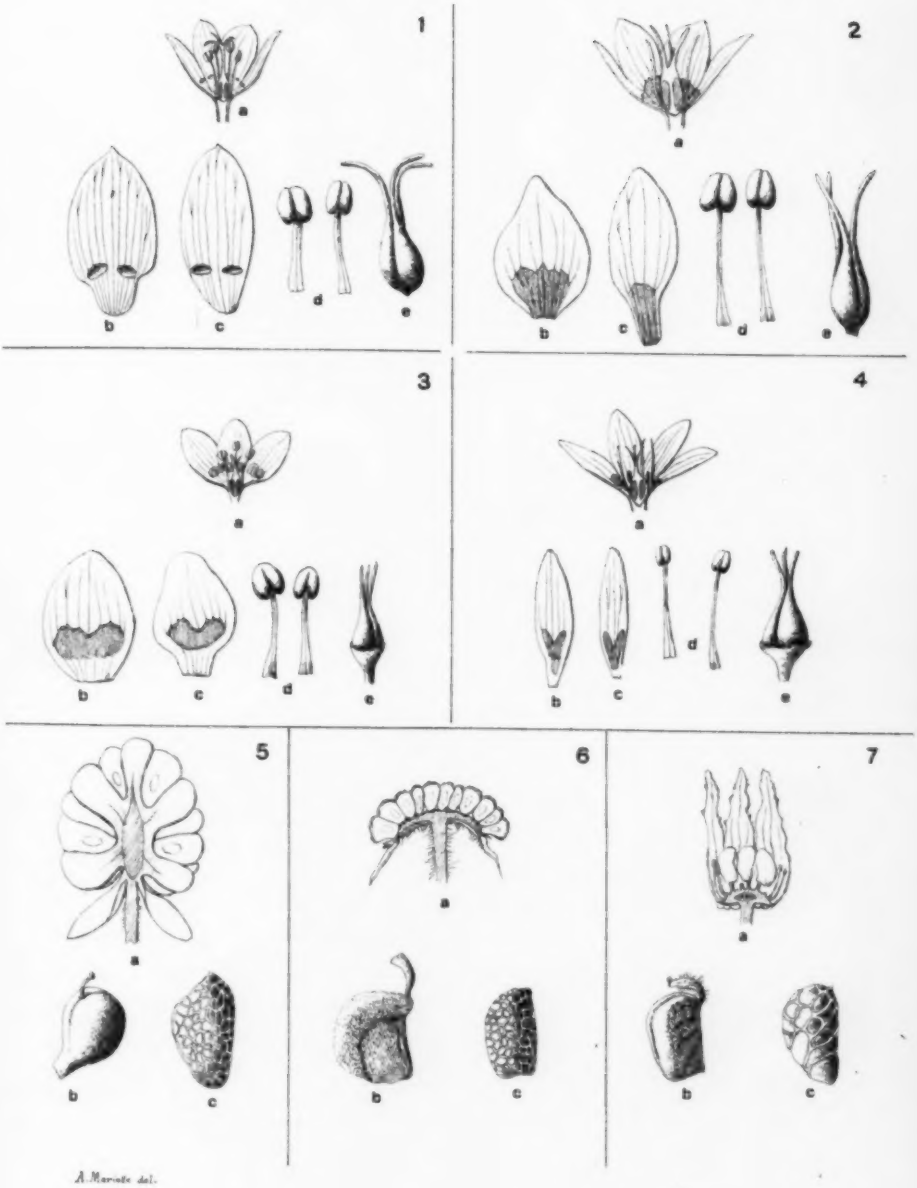

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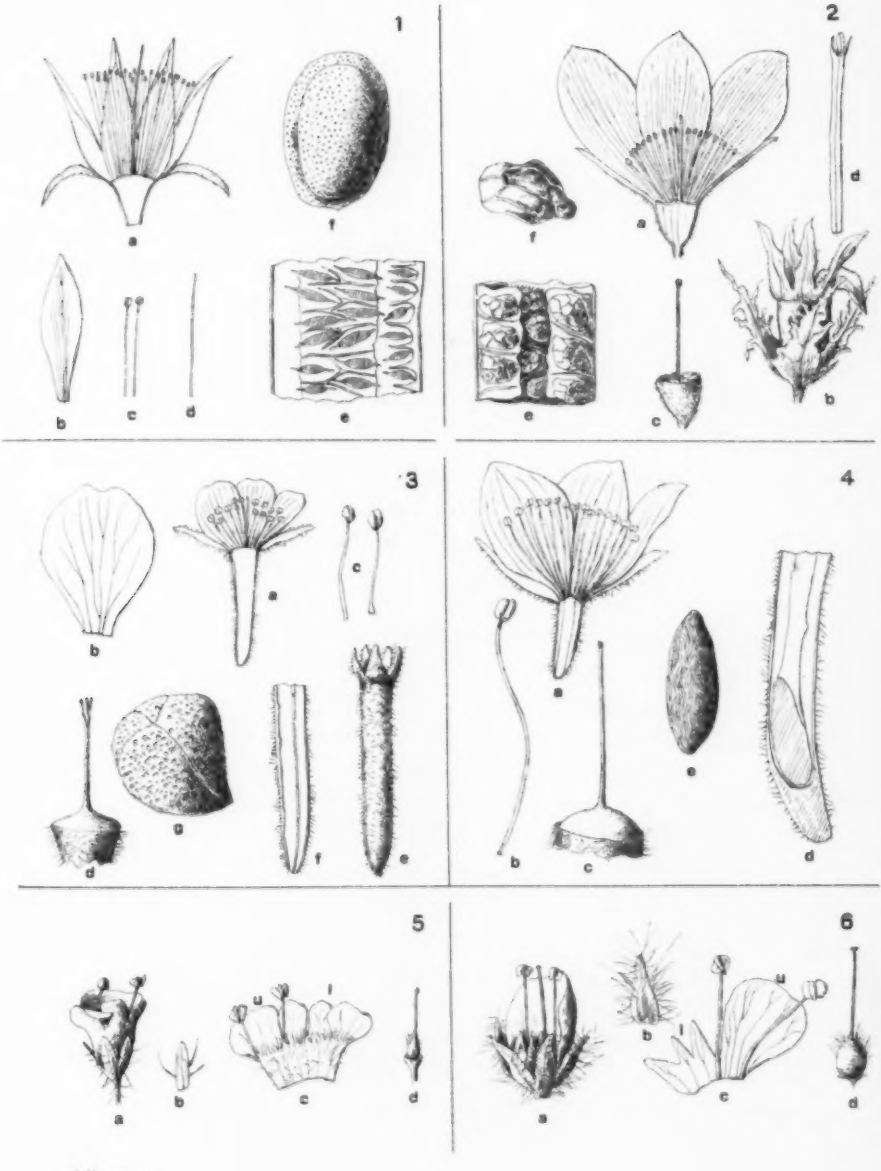

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